

CLAIMS:

What is claimed is:

1. A method for a first peer and a second peer to share a plurality of data transfers to one or more storage devices, said first peer and said second peer each having access to said data transfers, where said method comprises the steps of:
 - 1.1. said first peer transferring a first number of data transfers to said one or more storage devices;
 - 1.2. said second peer transferring a second number of data transfers to said one or more storage devices;
 - 1.3. in response to said first peer completing said transfer of said first number of data transfers to said one or more storage devices, said first peer assisting said second peer with said second number of data transfers;
 - 1.4. in response to said second peer completing said transfer of said second number of data transfers to said one or more storage devices, said second peer assisting said first peer with said first number of data transfers; and
 - 1.5. in response to said first peer and said second peer not completing all data transfers, returning to step 1.3.
2. The method of claim 1, wherein step 1.3 further comprises the steps of:
 - 2.1. determining if said second peer needs assistance to transfer said second number of data transfers to said one or more storage devices;
 - 2.2. in response to determining that said second peer needs assistance to transfer said second number of data transfers to said one or more storage devices:
 - 2.2.1. assigning a portion of said second number of data transfers from said second peer to said first peer as said first number of data transfers;
 - 2.2.2. adjusting a first peer ratio and a second peer ratio; and

- 2.2.3. said first peer transferring said portion of said second number of data transfers to said one or more storage devices.
- 3. The method of claim 1, wherein step 1.4 further comprises the steps of:
 - 3.1. determining if said first peer needs assistance to transfer said first number of data transfers to said one or more storage devices;
 - 3.2. in response to determining that said first peer needs assistance to transfer said first number of data transfers to said one or more storage devices:
 - 3.2.1. adjusting a first peer ratio and a second peer ratio;
 - 3.2.2. assigning a portion of said first number of data transfers from said first peer to said second peer as said second number of data transfers; and
 - 3.2.3. said second peer transferring said portion of said first number of data transfers to said one or more storage devices.
- 4. The method of claim 2, wherein step 2.1 further comprises the steps of:
 - 4.1. determining a first peer ratio and a second peer ratio;
 - 4.2. determining a portion of second number of transfers that is equal to said second peer ratio multiplied by a remaining second number of transfers;
 - 4.3. in response to said portion of second number of transfers being greater than a second peer minimum number of transfers, said second peer sending an “assistance needed” message to said first peer; and
 - 4.4. in response to said portion of second number of transfers being less than or equal to said second peer minimum number of transfers, said second peer sending a “no assistance needed” message to said first peer.
- 5. The method of claim 3, wherein step 3.1 further comprises the steps of:
 - 5.1. determining a first peer ratio and a second peer ratio;
 - 5.2. determining a portion of first number of transfers that is equal to said first peer ratio multiplied by a remaining first number of transfers;
 - 5.3. in response to said portion of first number of transfers being greater than a first peer minimum number of transfers, said first peer sending an “assistance needed” message to said second peer; and

- 5.4. in response to said portion of first number of transfers being less than or equal to said first peer minimum number of transfers, said first peer sending a “no assistance needed” message to said second peer.
6. The method of claim 4, wherein step 4.1 further comprises:
 - 6.1. in response to determining that said first peer assisted said second peer with said second number of data transfers at the previous execution of step 1.3, increasing said second peer ratio by a second increment; and
 - 6.2. in response to determining that said second peer assisted said first peer with said first number of data transfers at the previous execution of step 1.4, decreasing said first peer ratio by a first increment.
7. The method of claim 5, wherein step 5.1 further comprises:
 - 7.1. in response to determining that said second peer assisted said first peer with said first number of data transfers at the previous execution of step 1.4, increasing said first peer ratio by a first increment;
 - 7.2. in response to determining that said first peer assisted said second peer with said second number of data transfers at the previous execution of step 1.3, decreasing said second peer ratio by a second increment.
8. An article of manufacture comprising a data storage medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to perform method steps for a first peer and a second peer to share a plurality of data transfers to one or more storage devices, said first peer and said second peer each having access to said data transfers, said method steps comprising:
 - 8.1. said first peer transferring a first number of data transfers to said one or more storage devices;
 - 8.2. said second peer transferring a second number of data transfers to said one or more storage devices;

- 8.3. in response to said first peer completing said transfer of said first number of data transfers to said one or more storage devices, said first peer assisting said second peer with said second number of data transfers;
 - 8.4. in response to said second peer completing said transfer of said second number of data transfers to said one or more storage devices, said second peer assisting said first peer with said first number of data transfers; and
 - 8.5. in response to said first peer and said second peer not completing all data transfers, returning to step 8.3.
9. The article of manufacture of claim 8, wherein step 8.3 further comprises the steps of:
- 9.1. determining if said second peer needs assistance to transfer said second number of data transfers to said one or more storage devices;
 - 9.2. in response to determining that said second peer needs assistance to transfer said second number of data transfers to said one or more storage devices:
 - 9.2.1. assigning a portion of said second number of data transfers from said second peer to said first peer as said first number of data transfers;
 - 9.2.2. adjusting a first peer ratio and a second peer ratio; and
 - 9.2.3. said first peer transferring said portion of said second number of data transfers to said one or more storage devices.
10. The article of manufacture of claim 8, wherein step 8.4 further comprises the steps of:
- 10.1. determining if said first peer needs assistance to transfer said first number of data transfers to said one or more storage devices;
 - 10.2. in response to determining that said first peer needs assistance to transfer said first number of data transfers to said one or more storage devices:
 - 10.2.1. adjusting a first peer ratio and a second peer ratio;
 - 10.2.2. assigning a portion of said first number of data transfers from said first peer to said second peer as said second number of data transfers; and
 - 10.2.3. said second peer transferring said portion of said first number of data transfers to said one or more storage devices.

11. The article of manufacture of claim 9, wherein step 9.1 further comprises the steps of:
 - 11.1. determining a first peer ratio and a second peer ratio;
 - 11.2. determining a portion of second number of transfers that is equal to said second peer ratio multiplied by a remaining second number of transfers;
 - 11.3. in response to said portion of second number of transfers being greater than a second peer minimum number of transfers, said second peer sending an “assistance needed” message to said first peer; and
 - 11.4. in response to said portion of second number of transfers being less than or equal to said second peer minimum number of transfers, said second peer sending a “no assistance needed” message to said first peer.
12. The article of manufacture of claim 10, wherein step 10.1 further comprises the steps of:
 - 12.1. determining a first peer ratio and a second peer ratio;
 - 12.2. determining a portion of first number of transfers that is equal to said first peer ratio multiplied by a remaining first number of transfers;
 - 12.3. in response to said portion of first number of transfers being greater than a first peer minimum number of transfers, said first peer sending an “assistance needed” message to said second peer; and
 - 12.4. in response to said portion of first number of transfers being less than or equal to said first peer minimum number of transfers, said first peer sending a “no assistance needed” message to said second peer.
13. The article of manufacture of claim 11, wherein step 11.3 further comprises the steps of:
 - 13.1. in response to determining that said first peer assisted said second peer with said second number of data transfers at the previous execution of step 8.3, increasing said second peer ratio by a second increment; and
 - 13.2. in response to determining that said second peer assisted said first peer with said first number of data transfers at the previous execution of step 8.4, decreasing said first peer ratio by a first increment.
14. The article of manufacture of claim 12, wherein step 12.1 further comprises the steps of:

- 14.1. in response to determining that said second peer assisted said first peer with said first number of data transfers at the previous execution of step 8.4, increasing said first peer ratio by a first increment;
 - 14.2. in response to determining that said first peer assisted said second peer with said second number of data transfers at the previous execution of step 8.3, decreasing said second peer ratio by a second increment.
15. A data storage system comprising:
- one or more storage devices;
 - a storage management device for providing access to said one or more storage devices;
 - a first peer for transferring data to said one or more storage devices;
 - a second peer for transferring data to said one or more storage devices, wherein said first peer and said second peer are programmed to perform method steps for said first peer and said second peer to share a plurality of data transfers to said one or more storage devices, said first peer and said second peer each having access to said data transfers, comprising the steps of:
- 15.1. said first peer transferring a first number of data transfers to said one or more storage devices;
 - 15.2. said second peer transferring a second number of data transfers to said one or more storage devices;
 - 15.3. in response to said first peer completing said transfer of said first number of data transfers to said one or more storage devices, said first peer assisting said second peer with said second number of data transfers;
 - 15.4. in response to said second peer completing said transfer of said second number of data transfers to said one or more storage devices, said second peer assisting said first peer with said first number of data transfers; and
 - 15.5. in response to said first peer and said second peer not completing all data transfers, returning to step 15.3.
16. The system of claim 15, wherein step 15.3 further comprises the steps of:

- 16.1. determining if said second peer needs assistance to transfer said second number of data transfers to said one or more storage devices;
- 16.2. in response to determining that said second peer needs assistance to transfer said second number of data transfers to said one or more storage devices:
 - 16.2.1. assigning a portion of said second number of data transfers from said second peer to said first peer as said first number of data transfers;
 - 16.2.2. adjusting a first peer ratio and a second peer ratio; and
 - 16.2.3. said first peer transferring said portion of said second number of data transfers to said one or more storage devices.
17. The system of claim 15, wherein step 15.4 further comprises the steps of:
 - 17.1. determining if said first peer needs assistance to transfer said first number of data transfers to said one or more storage devices;
 - 17.2. in response to determining that said first peer needs assistance to transfer said first number of data transfers to said one or more storage devices:
 - 17.2.1. adjusting a first peer ratio and a second peer ratio;
 - 17.2.2. assigning a portion of said first number of data transfers from said first peer to said second peer as said second number of data transfers; and
 - 17.2.3. said second peer transferring said portion of said first number of data transfers to said one or more storage devices.
18. The system of claim 16, wherein step 16.1 further comprises the steps of:
 - 18.1. determining a first peer ratio and a second peer ratio;
 - 18.2. determining a portion of second number of transfers that is equal to said second peer ratio multiplied by a remaining second number of transfers;
 - 18.3. in response to said portion of second number of transfers being greater than a second peer minimum number of transfers, said second peer sending an “assistance needed” message to said first peer; and
 - 18.4. in response to said portion of second number of transfers being less than or equal to said second peer minimum number of transfers, said second peer sending a “no assistance needed” message to said first peer.

19. The system of claim 17, wherein step 17.1 further comprises the steps of:
- 19.1. determining a first peer ratio and a second peer ratio;
 - 19.2. determining a portion of first number of transfers that is equal to said first peer ratio multiplied by a remaining first number of transfers;
 - 19.3. in response to said portion of first number of transfers being greater than a first peer minimum number of transfers, said first peer sending an “assistance needed” message to said second peer; and
 - 19.4. in response to said portion of first number of transfers being less than or equal to said first peer minimum number of transfers, said first peer sending a “no assistance needed” message to said second peer.
20. The system of claim 18, wherein step 18.1 further comprises:
- 20.1. in response to determining that said first peer assisted said second peer with said second number of data transfers at the previous execution of step 15.3, increasing said second peer ratio by a second increment; and
 - 20.2. in response to determining that said second peer assisted said first peer with said first number of data transfers at the previous execution of step 15.4, decreasing said first peer ratio by a first increment.
21. The system of claim 19, wherein step 19.1 further comprises:
- 21.1. in response to determining that said second peer assisted said first peer with said first number of data transfers at the previous execution of step 15.4, increasing said first peer ratio by a first increment;
 - 21.2. in response to determining that said first peer assisted said second peer with said second number of data transfers at the previous execution of step 15.3, decreasing said second peer ratio by a second increment.